



IMPULSE RADIO ULTRA-WIDEBAND

DESCRIPTION

Imec's Impulse Radio Ultra-Wideband (IR-UWB) operates in the bandwidth between 6 and 9GHz with worldwide available channels. The radio is compliant to the IEEE802.15.4a standard, and it features proprietary modes that enhance the low-power performance.

The pulse based communication enables a very scalable air interface in terms of data rate, power consumption, latency, etc. Data rates range from 110 kbps to 27 Mbps.

IR-UWB enables very low-power transmitter design. In addition, the radio also features a low-power implementation of the receiver. A complete radio is offered, including the IC-implementation of the RF front-end and digital baseband, algorithms for low-power frequency tracking and synchronization and for localization, proprietary antennas as well as a light weight MAC implementation for demonstration purposes. The radio is available both as a chipset, as well as on a FPGA based platform.

Target applications include medium data rate (up to 27Mbps) data streaming, robust communication in environments that suffer from multipath propagation (such as automotive) and precision real time localization systems (RTLs).

KEY FEATURES

6-9 GHz band operation, 802.15.4A compliant
Scalable rates: 110kbps to 27Mbps

Ultra-low power consumption:

- Single chip transmitter
- 3.5mW power consumption @ 1Mbps
- Receiver front-end chip: 9mW @ 1Mbps
- Receiver digital baseband on FPGA
- SAR ADC: 4.9ENOB, 0.5GS/s, 0.5mW

Real-time localization

- High accuracy <10cm with line of sight
- Small size tags: 4x4.8cm

Audio streaming

- 12m range @ 475 kbps, 5ms latency
- Interference resilient operation
- Proven ear-to-ear communication in hearing aids
- Miniaturized proprietary antennas

APPLICATIONS

- Accurate localization
- High quality audio streaming
- Hearing aids
- Automotive

TECHNOLOGY DEMONSTRATOR

A complete IR-UWB demonstrator is available, which consists of the following boards:

- An RF board with the receiver front-end IC and multiple additional components for evaluation and back-up (MSP430, PLL ICs, regulator IC, battery management, etc.).
- A dual ADC board with state-of-the-art, proprietary ADCs.
- A receiver baseband mapped on a SMT351 FPGA board.

The 3 boards can be stacked on top of each other as a receiver module. The demonstrator includes proprietary UWB antennas, light-weight MAC for demonstration of data streaming, and software for control and debug.

LOCALIZATION AND AUDIO PLATFORMS

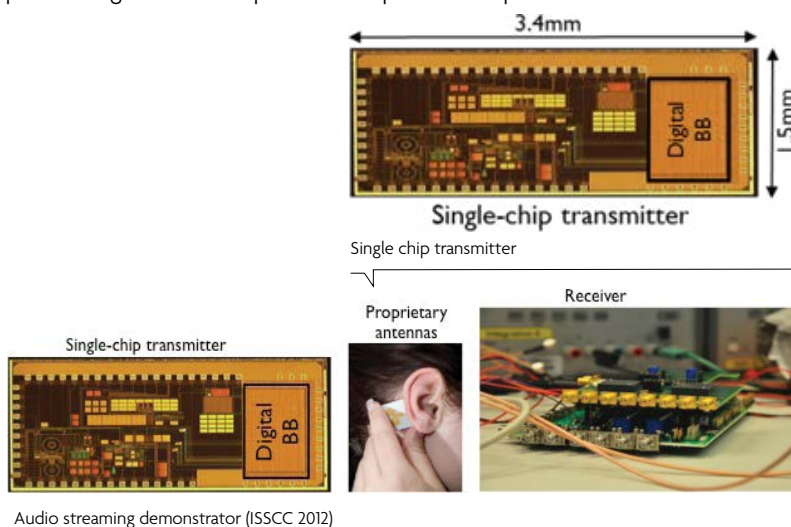
The radio is demonstrated in two setups. In a first demonstrator, high-end audio is being streamed over an IR-UWB wireless link.

In a second demonstrator, the IR-UWB radio is used as part of a localization set-up. The transmitter is located relative to the receiver base stations with an accuracy of well below 10cm over a distance of 15m.

IP AVAILABLE FOR LICENSING

This technology is available for licensing. A Technology License Agreement (TLA) includes the following:

- 'White box' license on imec technology
- Technology transfer: designs, evaluation boards, and documentation
- Support during the transfer phase & the production phase



SYSTEM SPECIFICATIONS

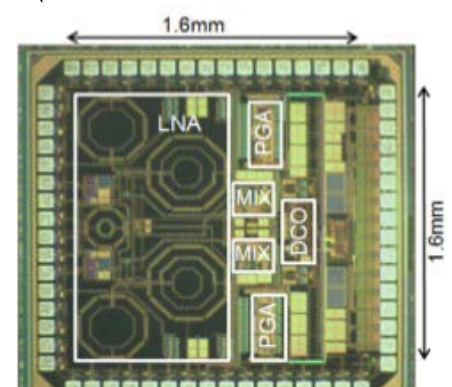
Frequency band	6GHz - 9GHz
Data rate	110Kbps - 27Mbps
Standards	IEEE 802.15.4A and proprietary modes
Technology	90nm CMOS
Digital interfaces	SPI, I2S, GPIO

KEY ELECTRICAL SPECIFICATIONS

Parameter	Value	Unit
Supply voltage	1	V
Maximum output power	+13	dBm
TX efficiency	14	%
TX power consumption @ 1Mbps (analog + digital)	3,5	mW
RS sensitivity @ 1Mbps	-82	dBm
RX power consumption @ 1Mbps (analog + digital)	9	mW



Receiver board (DBB and FPGA)



Receiver front-end chip

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